Vermont Forest Carbon: Opportunities for private landowners

Final Report May 2020
Middlebury College ENVS 401

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In partnership with Keith Thompson of the Vermont Department of Forests, Parks, and Recreation

Executive Summary: The Vermont Forest Carbon Sequestration Working Group, formed by an act of the Vermont General Assembly, published their final report in January 2020. This group recommended that the Vermont Department of Forests, Parks, and Recreation (DFPR) work to develop informational materials for private landowners in order to facilitate participation in carbon offset markets (Vermont Forest Carbon Sequestration Working Group). As such, we have worked with DFPR to produce an informational pamphlet that will provide landowners with a general overview of carbon market opportunities in Vermont and help direct interested landowners to other resources and the next steps they should take in pursuing an offset project. The pamphlet provides general information about carbon sequestration, co-benefits of managing for carbon, the types of carbon markets, how selling carbon credits interacts with other common land management practices like UVA, the basics of selling carbon, and potential ways to begin to pursue a carbon offset project.

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Project Overview

Forests represent 78% of Vermont's land cover, and the majority of this forestland is privately owned and in small parcels (Morin). In 2019, the Vermont legislature passed Act 83, establishing a Vermont Forest Carbon Sequestration Working Group to "study how to create a statewide program to facilitate the enrollment of Vermont forestlands in carbon sequestration markets"(Vermont Forest Carbon Sequestration Working Group). A significant component of this initiative 's focus is communication.

Although the legislature expressed interest in exploring carbon offsets in Vermont, there are currently few offset projects in the state (Vermont Forest Carbon Sequestration Working Group). A variety of misconceptions and gaps in information may influence the lack of carbon offset developments thus far. Vermont forestland owners may not be aware of carbon market opportunities, may prefer other alternatives for preserving and managing forestland, and/or may feel uncertain about navigating and developing a carbon offset project. The management decisions of private landowners play an integral role in maintaining forest health and fostering climate resilience in Vermont. Carbon offsets provide incentive to keep forests as forests. The goal of this project was to produce an informational pamphlet that provides an overview of the basics of carbon markets, the opportunities that exist in Vermont for offsets and to clarify some common misconceptions of carbon markets. Our project endeavored to create informational materials in partnership with the Vermont Department of Forest Parks and Recreation to inform private landowners about voluntary carbon markets and help them begin to evaluate how well suited their land is for this type of offset project.

We created a pamphlet that strives to cover the general questions that private landowners might have about the potential for forest carbon projects on their land. We sought to clarify potential questions and concerns regarding the carbon cycle, types of markets, obligations, risks, profitability and the next steps an interested landowner should take. We hoped to provide landowners with a tool to help them determine the viability of selling their forest carbon.

Methods

We began our work by reviewing available literature surrounding carbon offset opportunities in the voluntary market, specifically in Vermont. The January 2020 Vermont Forest Carbon Sequestration Working Group Report and Bill Keeton's 2018 report, "Vermont Forest Carbon: A market opportunity for forestland owners" served as the starting point of our research. In addition to continued engagement with literature regarding carbon offset markets, we focused our energy on sourcing a wide array of perspectives from 3 practicing county foresters in Vermont and 2 academics in the field. The goals of our conversations were twofold: to gain a clear understanding of the primary concerns of private landowners in Vermont and the unique perspective of the foresters on the trends and commonalities in Vermont forest management and the growing interest in carbon markets. The insights gleaned in our conversations with Vermont foresters informed and strengthened the information we provide in our final product.

Our community partner, Keith Thompson at the Vermont DFPR who guided us throughout this project, also provided a list of questions that our pamphlet should ultimately attempt to answer.

Questions to Answer as Provided by Community Partner:

1. How much does it cost to develop a project?
2. Who do I engage?
3. How much money am I going to make?
4. What are my obligations?
5. What is the risk?
6. Is it good for the forests?
7. **Can I sell my carbon? **

The absence of robust information on existing carbon offset projects in Vermont served as a significant challenge in answering these definitively. Additionally, we came to understand opportunities for offsets vary greatly based on the specific forestland being assessed. With that said, we did our best to provide an informative guideline for Vermont private landowners regarding carbon offsets.

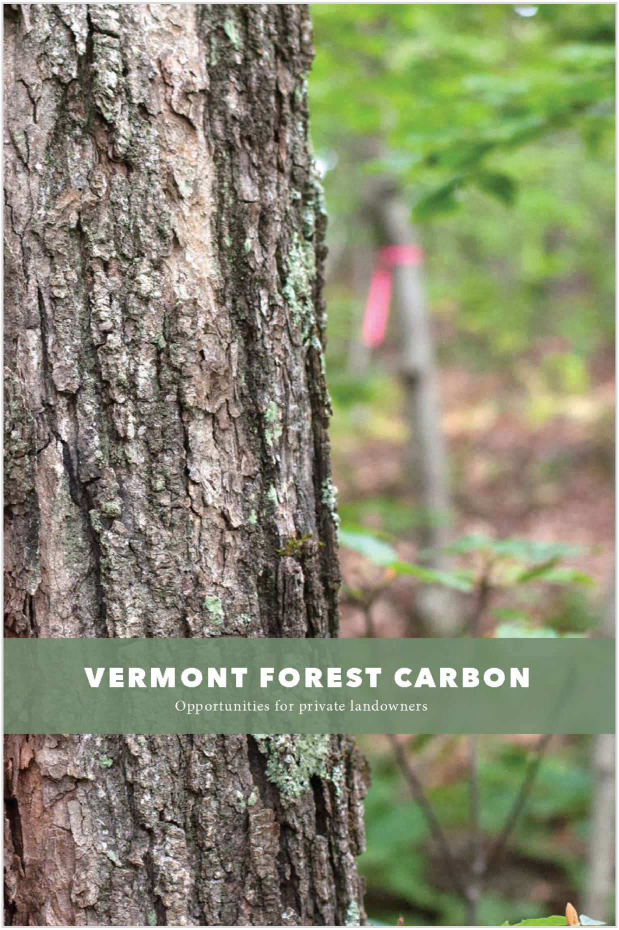
Findings

We based the pamphlet's format and structure on feedback from foresters and the 2014 Vermont Woodland Owners Survey. Aside from in-person conversations, at this time, paper materials are the most effective method of communication with the existing demographic of private landowners in Vermont. For the design, our goal was to create accessible graphics and diagrams that clearly conveyed our messages. The length of the pamphlet was based on the input we received through our interviews and from our community partner. The text on each page is concise and minimal making the entire pamphlet about a 7-minute read. Appropriate images have been included to break up and separate the text, keeping readers engaged while still conveying the necessary information. We wanted the design to be simple and cohesive with some of the other informational material that has been released by DFPR.

Input from landowners and foresters also guided the revision process of both content and design. After a preliminary draft of the pamphlet, we sought out reviews and critiques from a variety of these perspectives. We presented the pamphlet to a group from the Private Lands Advisory Committee that included both private landowners and foresters to ask for feedback on both design and content. From this, it was reinforced that foresters are going to be a primary point of contact that will serve as trusted advisors and resources for landowners as carbon offset projects become feasible on a wider scale across Vermont. We also sent a draft to the foresters who we had initially reached out to during our research phase, as well as several other individuals with experience regarding forest carbon and carbon markets. With all of these suggestions in mind we restructured and revised the pamphlet to create a final version.

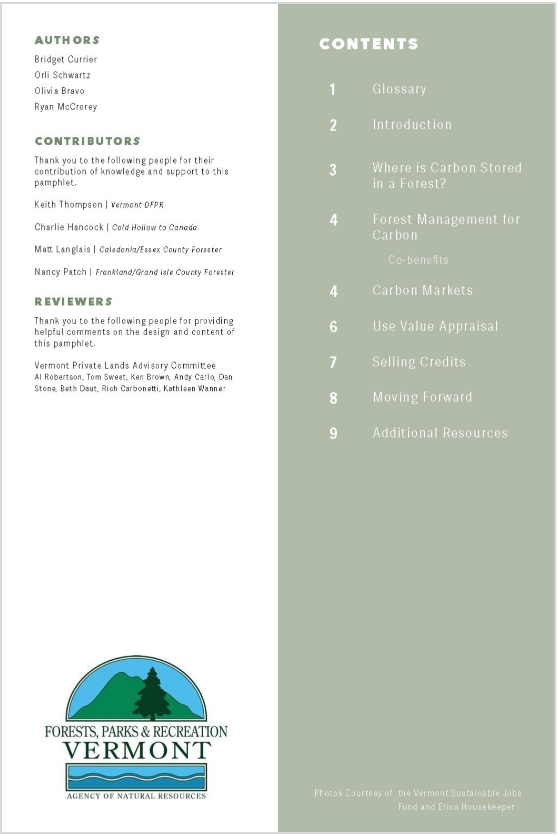
It is clear the robust network of Vermont consulting foresters will be a crucial channel for distributing this information based on the relationships they have developed with landowners. Multiple county foresters have emphasized trust as an essential part of effective collaboration with landowners.

Pamphlet



VERMONT FOREST CARBON

Opportunities for private landowners



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CONTRIBUTORS

Thank you to the following people for their contribution of knowledge and support to this pamphlet.

Keith Thompson | *Vermont DFPR*

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REVIEWERS

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FORESTS, PARKS & RECREATION
VERMONT
AGENCY OF NATURAL RESOURCES

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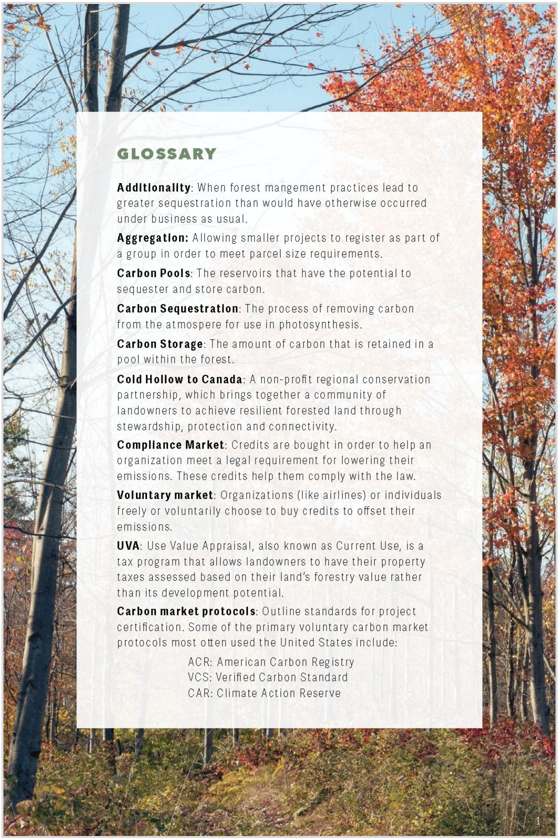
Photos Courtesy of the Vermont Sustainable Jobs Fund and Erica Housekeeper



GLOSSARY

Additionality: When forest mangement practices lead to greater sequestration than would have otherwise occurred under business as usual.

Aggregation: Allowing smaller projects to register as part of a group in order to meet parcel size requirements.

Carbon Pools: The reservoirs that have the potential to sequester and store carbon.

Carbon Sequestration: The process of removing carbon from the atmospere for use in photosynthesis.

Carbon Storage: The amount of carbon that is retained in a pool within the forest.

Cold Hollow to Canada: A non-profit regional conservation partnership, which brings together a community of landowners to achieve resilient forested land through stewardship, protection and connectivity.

Compliance Market: Credits are bought in order to help an organization meet a legal requirement for lowering their emissions. These credits help them comply with the law.

Voluntary market: Organizations (like airlines) or individuals freely or voluntarily choose to buy credits to offset their emissions.

UVA: Use Value Appraisal, also known as Current Use, is a tax program that allows landowners to have their property taxes assessed based on their land's forestry value rather than its development potential.

Carbon market protocols: Outline standards for project certification. Some of the primary voluntary carbon market protocols most otten used the United States include:

ACR: American Carbon Registry
VCS: Verified Carbon Standard
CAR: Climate Action Reserve

Introduction

Forests are a fundamental natural solution for climate change. In addition to climate change, managing forests with carbon in mind aligns with many other land management goals.

As a landowner, the land-use decisions you make regarding your forests can play an important role in building resilient forests in Vermont and around the world.

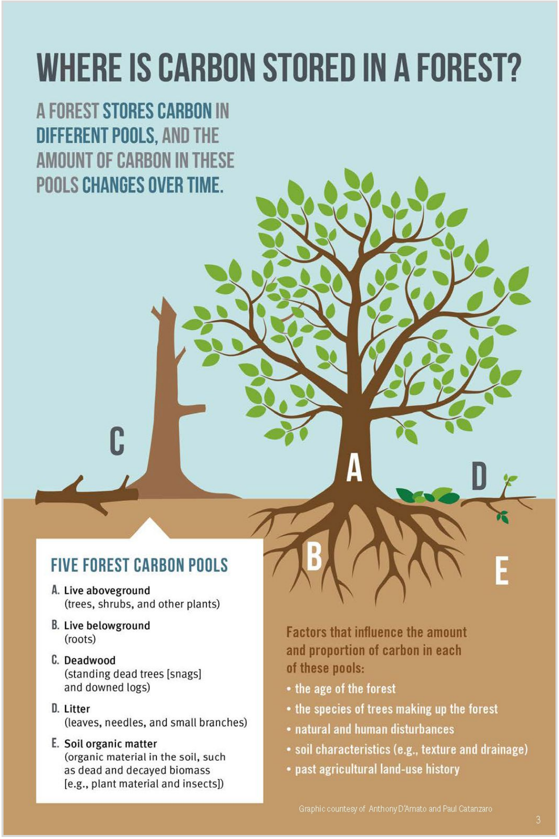
Managing forests to optimize the carbon they store provides opportunities for landowners to participate in carbon markets. Participation in carbon markets encourages forest stewardship which can lead to a variety of benefits that yield positive outcomes for landowners and forests alike.

In total, Vermont has at least 4.5 million acres of forest cover of which roughly 80% is privately owned. Because of this, Vermont has a strong incentive to protect and enhance forests and the many values and benefits they provide.

As a landowner, you might employ in a number of land use strategies to maximize the potential benefits of your land. Some of these strategies include reforestation, afforestation, and lengthened harvest cycles.

Along with enhancing many crucial aspects of forest health, managing for carbon can potentially lead to economic opportunities for landowners through selling carbon offsets. The eligibility for carbon market participation is largely a factor of parcel acreage. For the purposes of this pamphlet, all parcels under 250 acres will be referred to as small. Parcels greater than 250 acres are considered large.

The intent of this publication is to help prepare you to make informed decisions about your forest land by giving you a better understanding of the role carbon plays within Vermont forests and the opportunity to participate in a voluntary carbon market. Ultimately, pursuing a carbon offset project will necessitate collaboration with a consulting or county forester.



WHERE IS CARBON STORED IN A FOREST?

A FOREST STORES CARBON IN DIFFERENT POOLS, AND THE AMOUNT OF CARBON IN THESE POOLS CHANGES OVER TIME.

FIVE FOREST CARBON POOLS

A. **Live aboveground**
(trees, shrubs, and other plants)

B. **Live belowground**
(roots)

C. **Deadwood**
(standing dead trees [snags] and downed logs)

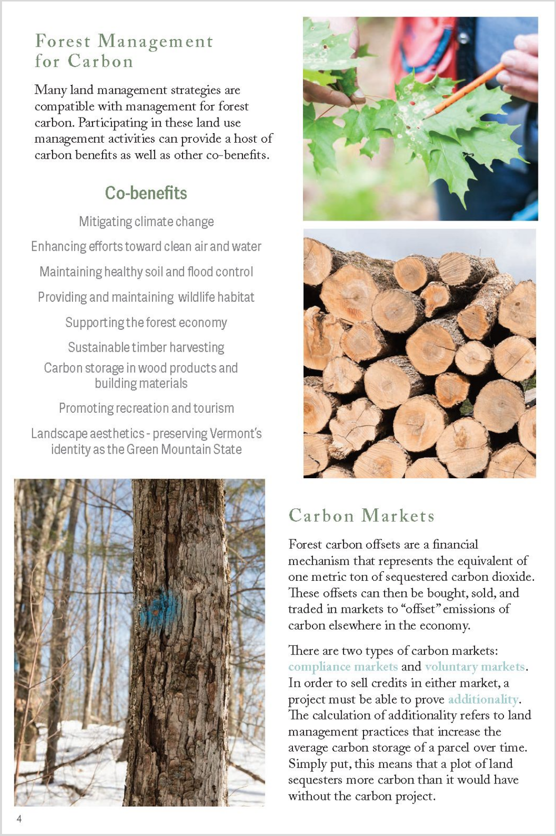
D. **Litter**
(leaves, needles, and small branches)

E. **Soil organic matter**
(organic material in the soil, such as dead and decayed biomass [e.g., plant material and insects])

Factors that influence the amount and proportion of carbon in each of these pools:

- the age of the forest
- the species of trees making up the forest
- natural and human disturbances
- soil characteristics (e.g., texture and drainage)
- past agricultural land-use history

Graphic countesy of Anthony D'Amato and Paul Catanzaro



Forest Management for Carbon

Many land management strategies are compatible with management for forest carbon. Participating in these land use management activities can provide a host of carbon benefits as well as other co-benefits.

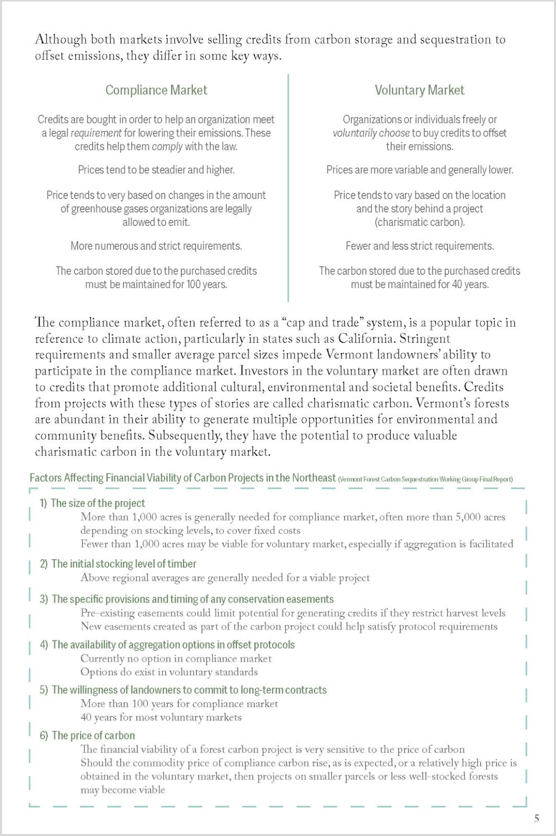
Co-benefits

Mitigating climate change
Enhancing efforts toward clean air and water
Maintaining healthy soil and flood control
Providing and maintaining wildlife habitat
Supporting the forest economy
Sustainable timber harvesting
Carbon storage in wood products and building materials
Promoting recreation and tourism
Landscape aesthetics - preserving Vermont's identity as the Green Mountain State

Carbon Markets

Forest carbon offsets are a financial mechanism that represents the equivalent of one metric ton of sequestered carbon dioxide. These offsets can then be bought, sold, and traded in markets to "offset" emissions of carbon elsewhere in the economy.

There are two types of carbon markets: compliance markets and voluntary markets. In order to sell credits in either market, a project must be able to prove additionality. The calculation of additionality refers to land management practices that increase the average carbon storage of a parcel over time. Simply put, this means that a plot of land sequesters more carbon than it would have without the carbon project.



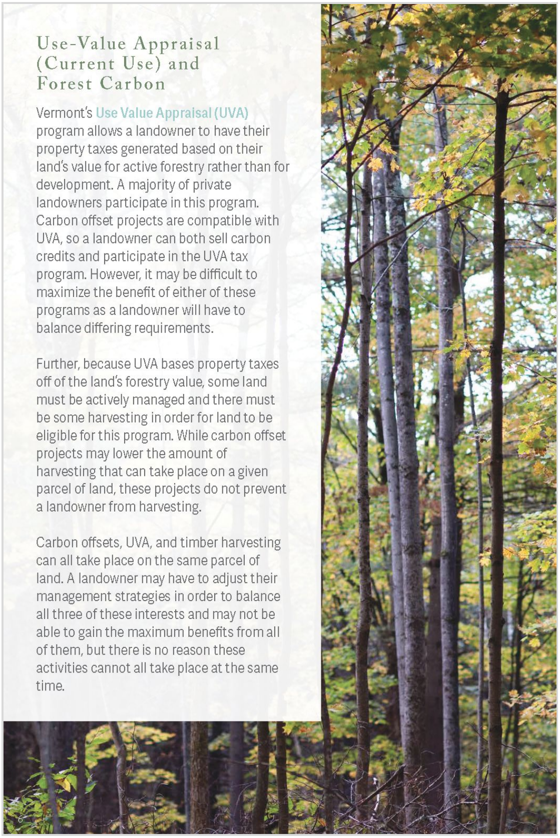
Although both markets involve selling credits from carbon storage and sequestration to offset emissions, they differ in some key ways.

Compliance Market	Voluntary Market
Credits are bought in order to help an organization meet a legal *requirement* for lowering their emissions. These credits help them *comply* with the law.	Organizations or individuals freely or *voluntarily choose* to buy credits to offset their emissions.
Prices tend to be steadier and higher.	Prices are more variable and generally lower.
Price tends to very based on changes in the amount of greenhouse gases organizations are legally allowed to emit.	Price tends to vary based on the location and the story behind a project (charismatic carbon).
More numerous and strict requirements.	Fewer and less strict requirements.
The carbon stored due to the purchased credits must be maintained for 100 years.	The carbon stored due to the purchased credits must be maintained for 40 years.

The compliance market, often referred to as a "cap and trade" system, is a popular topic in reference to climate action, particularly in states such as California. Stringent requirements and smaller average parcel sizes impede Vermont landowners' ability to participate in the compliance market. Investors in the voluntary market are often drawn to credits that promote additional cultural, environmental and societal benefits. Credits from projects with these types of stories are called charismatic carbon. Vermont's forests are abundant in their ability to generate multiple opportunities for environmental and community benefits. Subsequently, they have the potential to produce valuable charismatic carbon in the voluntary market.

Factors Affecting Financial Viability of Carbon Projects in the Northeast (Vermont Forest Carbon Sequestration Working Group Final Report)

1) The size of the project
    More than 1,000 acres is generally needed for compliance market, often more than 5,000 acres depending on stocking levels, to cover fixed costs
    Fewer than 1,000 acres may be viable for voluntary market, especially if aggregation is facilitated
2) The initial stocking level of timber
    Above regional averages are generally needed for a viable project
3) The specific provisions and timing of any conservation easements
    Pre-existing easements could limit potential for generating credits if they restrict harvest levels
    New easements created as part of the carbon project could help satisfy protocol requirements
4) The availability of aggregation options in offset protocols
    Currently no option in compliance market
    Options do exist in voluntary standards
5) The willingness of landowners to commit to long-term contracts
    More than 100 years for compliance market
    40 years for most voluntary markets
6) The price of carbon
    The financial viability of a forest carbon project is very sensitive to the price of carbon
    Should the commodity price of compliance carbon rise, as is expected, or a relatively high price is obtained in the voluntary market, then projects on smaller parcels or less well-stocked forests may become viable

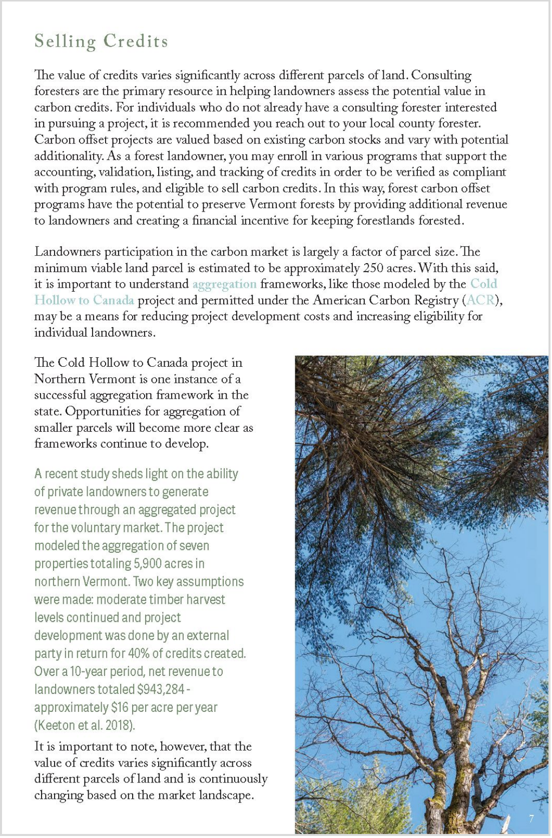


Use-Value Appraisal (Current Use) and Forest Carbon

Vermont's Use Value Appraisal (UVA) program allows a landowner to have their property taxes generated based on their land's value for active forestry rather than for development. A majority of private landowners participate in this program. Carbon offset projects are compatible with UVA, so a landowner can both sell carbon credits and participate in the UVA tax program. However, it may be difficult to maximize the benefit of either of these programs as a landowner will have to balance differing requirements.

Further, because UVA bases property taxes off of the land's forestry value, some land must be actively managed and there must be some harvesting in order for land to be eligible for this program. While carbon offset projects may lower the amount of harvesting that can take place on a given parcel of land, these projects do not prevent a landowner from harvesting.

Carbon offsets, UVA, and timber harvesting can all take place on the same parcel of land. A landowner may have to adjust their management strategies in order to balance all three of these interests and may not be able to gain the maximum benefits from all of them, but there is no reason these activities cannot all take place at the same time.



Selling Credits

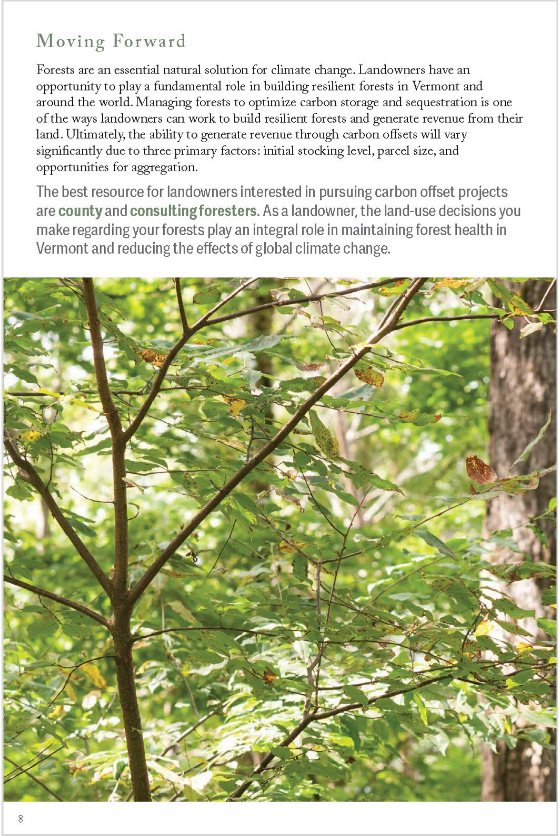
The value of credits varies significantly across different parcels of land. Consulting foresters are the primary resource in helping landowners assess the potential value in carbon credits. For individuals who do not already have a consulting forester interested in pursuing a project, it is recommended you reach out to your local county forester. Carbon offset projects are valued based on existing carbon stocks and vary with potential additionality. As a forest landowner, you may enroll in various programs that support the accounting, validation, listing, and tracking of credits in order to be verified as compliant with program rules, and eligible to sell carbon credits. In this way, forest carbon offset programs have the potential to preserve Vermont forests by providing additional revenue to landowners and creating a financial incentive for keeping forestlands forested.

Landowners participation in the carbon market is largely a factor of parcel size. The minimum viable land parcel is estimated to be approximately 250 acres. With this said, it is important to understand aggregation frameworks, like those modeled by the Cold Hollow to Canada project and permitted under the American Carbon Registry (ACR), may be a means for reducing project development costs and increasing eligibility for individual landowners.

The Cold Hollow to Canada project in Northern Vermont is one instance of a successful aggregation framework in the state. Opportunities for aggregation of smaller parcels will become more clear as frameworks continue to develop.

A recent study sheds light on the ability of private landowners to generate revenue through an aggregated project for the voluntary market. The project modeled the aggregation of seven properties totaling 5,900 acres in northern Vermont. Two key assumptions were made: moderate timber harvest levels continued and project development was done by an external party in return for 40% of credits created. Over a 10-year period, net revenue to landowners totaled $943,284 - approximately $16 per acre per year (Keeton et al. 2018).

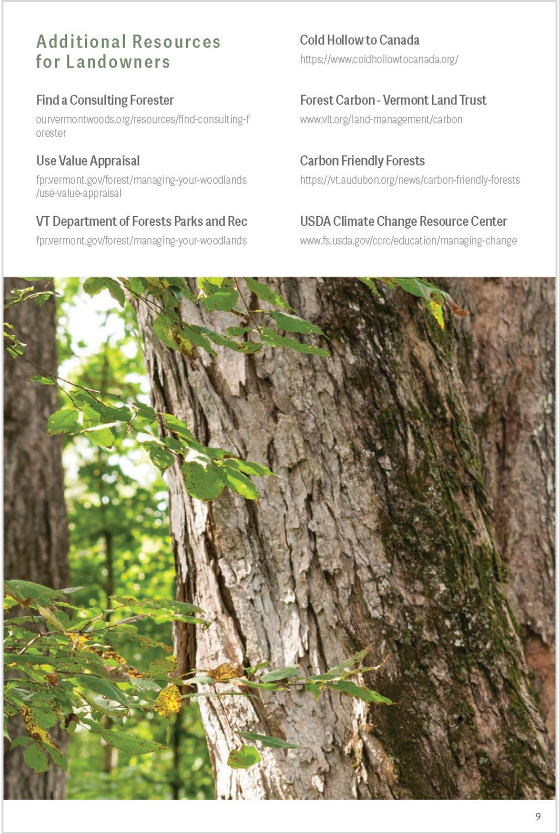
It is important to note, however, that the value of credits varies significantly across different parcels of land and is continuously changing based on the market landscape.



Moving Forward

Forests are an essential natural solution for climate change. Landowners have an opportunity to play a fundamental role in building resilient forests in Vermont and around the world. Managing forests to optimize carbon storage and sequestration is one of the ways landowners can work to build resilient forests and generate revenue from their land. Ultimately, the ability to generate revenue through carbon offsets will vary significantly due to three primary factors: initial stocking level, parcel size, and opportunities for aggregation.

The best resource for landowners interested in pursuing carbon offset projects are **county** and **consulting foresters**. As a landowner, the land-use decisions you make regarding your forests play an integral role in maintaining forest health in Vermont and reducing the effects of global climate change.



Additional Resources for Landowners

Find a Consulting Forester
ourvermontwoods.org/resources/find-consulting-forester

Use Value Appraisal
fpr.vermont.gov/forest/managing-your-woodlands/use-value-appraisal

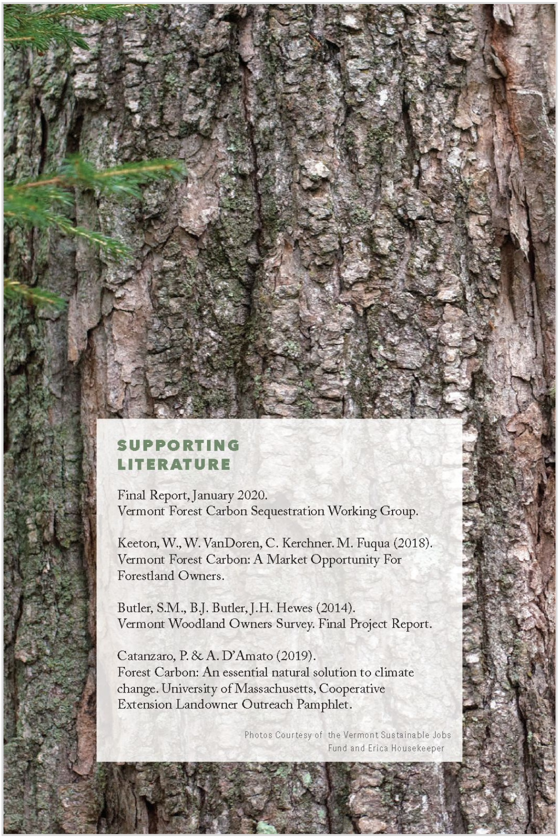
VT Department of Forests Parks and Rec
fpr.vermont.gov/forest/managing-your-woodlands

Cold Hollow to Canada
https://www.coldhollowtocanada.org/

Forest Carbon - Vermont Land Trust
www.vlt.org/land-management/carbon

Carbon Friendly Forests
https://vt.audubon.org/news/carbon-friendly-forests

USDA Climate Change Resource Center
www.fs.usda.gov/ccrc/education/managing-change



SUPPORTING LITERATURE

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Vermont Forest Carbon Sequestration Working Group.

Keeton, W., W. VanDoren, C. Kerchner. M. Fuqua (2018).
Vermont Forest Carbon: A Market Opportunity For Forestland Owners.

Butler, S.M., B.J. Butler, J.H. Hewes (2014).
Vermont Woodland Owners Survey. Final Project Report.

Catanzaro, P. & A. D'Amato (2019).
Forest Carbon: An essential natural solution to climate change. University of Massachusetts, Cooperative Extension Landowner Outreach Pamphlet.

Photos Courtesy of the Vermont Sustainable Jobs Fund and Erica Housekeeper

Recommendations and Conclusion

Throughout our conversations with foresters, trust continually came up as an essential aspect of communication, especially when it comes to people's land. Currently, a strong foundation of trust exists between landowners and county foresters and, as such, foresters could serve as good messengers to distribute this valuable message to landowners, either through distributing paper materials or running in-person workshops or forums. Trust among community members will also prove essential to the success of potential future aggregation frameworks, which afford opportunities for collaboration between landowners.

We suggest future initiatives explore the possibility of presenting the same information over a digital platform. Moving to digital platforms will be helpful in increasing the project's longevity. As 21% of Vermont family forest owners are over the age of 65, it is likely that land may change hands in the near future and Vermont may see a changing landowner demographic (Butler et al.). It is unlikely paper materials will be the most effective form of communication in the long term. Additionally, digital platforms are a reliable way to foster and enhance communication between private landowners, foresters and VT-DFPR. Finally, it is both an upfront investment of time and capital, but ultimately will reduce the recurring investment of printing and distributing paper materials and allow landowners faster access to more up to date information. An online platform could serve as one comprehensive portal, reducing the compartmentalization of information in different difficult to access locations. While paper materials are an important part of this outreach effort and the preferred form of communication by the majority of current landowners, an online platform may help extend the shelf life of this information and provide greater access to this material (Butler et al.).

Carbon projects in Vermont may very well take root and provide a profitable way to maintain forests as forests; however, clearly, the frameworks and information about these types of projects are still developing and emerging. As such, outreach efforts may need to evolve and change quickly in order to adapt to the rapid changes in this burgeoning field. Currently, extending up-to-date information to landowners and working to reinforce trusting relationships between landowners and foresters will help all parties begin to explore the potential for carbon offset projects in Vermont.

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Sources

Matt Langlais: County Forester - Caledonia/Essex Counties
Nancy Patch: County Forester - Franklin/Grand Isle Counties
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Paul Catanzaro: Extension Associate Professor, UMass Amherst, Department of Environmental Conservation
Anthony D'Amato: Professor, Director of Forestry Program, Director of UVM Research Forests, University of Vermont, Rubenstein School of Environmental and Natural Resources

Butler, S.M., B.J. Butler, J.H. Hewes (2014). *Vermont Woodland Owners Survey*. Final Project Report.

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